RESEARCH STUDY

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Risk Factors for Recurrent Febrile Convulsions in Children

ARTICLE INFORMATION

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ABSTRACT

Background: Febrile convulsions are the most frequent type of seizures in children under 6 years of age. Significant percentage of these children will later suffer from recurrence of febrile convulsion.
Objectives: To identify the main risk factors for recurrent febrile convulsions in children.
Methods: we carried out a case control study involving 89 children those who experienced first attack of febrile convulsions and 92 children with recurrent attack of febrile convulsions. The study was conducted in Central Children Teaching Hospital, Baghdad during the period 2006- 2007.
Results: Compared to children with first attack of febrile convulsion, children with recurrent seizures were younger at onset (4- 12m) (67% vs. 44%), mainly male (70% vs. 51%) and had more often family history (first degree relative) history of epilepsy, low degree of temperature (45% vs. 23%) and frequent febrile illnesses (83% vs. 50%). second degree family history of febrile convulsion and onset of febrile convulsion in relation to onset of fever and type of convulsion (simple vs. complex) were not significant risk factors.
Conclusions: Awareness of these risk factors should lead pediatricians to suggest administration of short course of diazepam at onset of each febrile illness to prevent recurrent febrile convulsions. Also, public education on recurrent febrile convulsions is needed.

Introduction:

Convulsions triggered by fever, febrile Convulsions (FC) are the most common type of seizure, with a prevalence of 3 to 4 percent, which frequently recur, with a recurrence rate of 33 percent overall and 50 percent when the first febrile seizure occurs before one year of age [(1).] The risk of recurrence increases when there is a family history of febrile seizures and, in some but not all studies, when there is a family history of afebrile seizures and when the child has a neurologic abnormality [(2,3)]. Half the recurrences occur within six months of the first febrile seizure, three quarters within a year, and 90 percent within two years [(4)]. Febrile seizures are seizures that occur between the age of 6 and 60 months with a temperature of 38°C or higher , that are not the result of central nervous system infection or any metabolic imbalance, and that occur in the absence of a history of prior afebrile seizures[(5)]. Febrile seizures are typically divided into two types, "simple" and "complex". A simple FS comprises of generalized tonic-clonic activity without focal features, of less than 15 minutes duration, without a recurrence in the subsequent 24 hours and resolving spontaneously. Complex febrile seizures are defined on one or more of the following features: a partial (focal) onset or showing focal features during the seizure, prolonged duration (greater than 15 minutes), and recurrent within 24 hours or within same febrile illness [(3-5)].

One-third of children who have a first simple febrile seizure will have a second during a subsequent febrile illness, and half of these will have a third febrile seizure. One-half of recurrences occur within 6 months of the first febrile seizure, three fourths within a year, and 90% within 2 years. Less than 9% of children with febrile seizures have more than three [(5)]. Risk of recurrence is increased by: familial history of febrile seizures, first febrile seizure before 1 year, and body temperature less than 40°C [(6)].

Only 2% of neurologically normal children who experience a simple febrile seizure will have a nonfebrile seizure by age 7. In children with a prolonged or focal febrile seizures, a prior neurologic deficit, or a family history of epilepsy there is an increased, but still small (6%) probability of subsequent epilepsy [(7,8)]. There is no evidence that occasional febrile seizures or even febrile status epilepticus causes neurologic damage, mental retardation, a decrease in IQ, cerebral palsy, or learning problems [(9)].

The present study is aimed to identify the main risk factors for recurrent febrile convulsions in children.

Methods:

This is a prospective, case -control study conducted from 1st of January 2006 to the 1st of January 2007 on all patients with FC referred to the emergency department of Central Pediatric Teaching Hospital, were examined after taking full history, assessment and full investigation. Development assessment has been done for each patient.

Convulsions were labeled as febrile by excluding infections of central nervous system in developmentally normal children on basis of history, examination including

neurological examination and relevant laboratory investigation according to the provisional diagnosis. The total number of patients was 181 divided into two groups, 92 patients with recurrent attack of FC and 89 patients with 1st attack of FC. Patients with history of neonatal seizure or afebrile convulsion at any age were excluded from the study.

The following risk factors were studied: age, sex, family history of febrile convulsion in first and second degree relative, family history of epilepsy, onset of FC related to onset of fever, degree of temperature at onset of FC, type of FC and history of Febrile Illness (FI) per year. Data was analyzed using chi square. P-value <0.05 was regarded significant.

Results:

Results of the present study are illustrated in the following tables:

Table1: Distribution of the cases and controls according to age.

Age (months)	Cases No. (%)	Controls No. (%)	p- value
4-12	61 (67)	39 (44)	0.01
12-24	19 (20)	31 (34)	
>24	13 (13)	19 (22)	
Total	92 (100)	89 (100)	

Table 2: Distribution of the cases and controls according to sex.

Gender	Cases No. (%)	Controls No. (%)	p- value
Male	65 (70.6)	46 (51.6)	0.009
Female	27 (29.4)	43 (48.4)	
Total	92 (100)	89 (100)	

Table 3: Distribution of the cases and controls according to family history of FC in 1st degree relative.

Family History of FC in 1st degree relatives	Cases No. (%)	Controls No. (%)	p- value
present	54 (58.6)	36 (40.4)	0.014
absent	38 (41.4)	53 (59.6)	
Total	92 (100)	89 (100)	

Table 4: Distribution of the cases and controls according to family history of FC in 2nd degree relative.

Family History of FC in 2nd degree relatives	Cases No. (%)	Controls No. (%)	p- value
present	37 (40.2)	28 (31.4)	0.220
absent	55 (59.8)	61 (68.6)	
Total	92 (100)	89 (100)	

Table 5: Distribution of the cases and controls according to family history of epilepsy.

Family History of epilepsy	Cases No. (%)	Controls No. (%)	p- value
present	35 (38)	12 (13.5)	0.0002
absent	57 (62)	77 (86.5)	
Total	92 (100)	89 (100)	

Table 6: Distribution of the cases and controls according to the onset of FC with regard to onset of fever.

Onset of fever before onset of 1st FC	Cases No. (%)	Controls No. (%)	p- value
<2 hours	31 (33.6)	27 (30.3)	0.628
>2 hours	61 (66.3)	62 (69.7)	
Total	92 (100)	89 (100)	

Table 7: Distribution of the cases and controls according to the degree of temperature.

Temperature at onset of 1st FC	Cases No. (%)	Controls No. (%)	p- value
≤39°C	42 (45.6)	21 (23.6)	0.002
>39°C	50 (54.4)	68 (76.4)	
Total	92 (100)	89 (100)	

Table 8: Distribution of the cases and controls according to the type of convulsion.

Type of convulsion	Cases No. (%)	Controls No. (%)	p- value
Simple FC	44 (47.8)	49 (55.1)	0.331
Complex FC	48 (52.2)	40 (44.9)	
Total	92 (100)	89 (100)	

Table 9: Distribution of the cases and controls according to the number of Febrile Illnesses per year.

Number of Febrile Illnesses per year	Cases No. (%)	Controls No. (%)	p- value
>4 attack per year	77 (83.7)	50 (56.2)	0.0001
≤4 attack per year	15 (16.3)	39 (43.8)	
Total	92 (100)	89 (100)	

Discussion:

In this study we found that there are several risk factors predicting the possibility of recurrence of FC in children. Age of less than 12 months at the onset of the first FC is associated with increase incidence for recurrence of FC this result goes with the studies of Knudsen et.al and Tarkkar et.al [9, 10].

Also the result of our study is nearly identical with Martin-Fernandez et.al, who found that age at the onset of FC less than 16 months is a risk factor for recurrence of FC [13]. Our study also showed that an age of 12-24 months at initial seizure are associated with high risk group of recurrence of FC, this finding is not consistent with the finding of Offringa et.al [14], who found that the age below 30 months are associated with low risk of recurrence.

It was found that male are more liable to have recurrent of FC with two third of cases as compared to one half in control group 1.4:1 and this was reported by Bessisso et.al and Airede [15, 16], but this result is not compatible to what is found by Al Eissa, who found that gender had no role in occurrence of recurrence of FC [17].

We found that positive family history for FC can be elicited in 25-40% of patients with febrile seizures [11]. Family history of FC in a first degree relative is a risk factor

for recurrence of FC, and this result is in agreement with previous studies [9,12-14,18,19].

Family history of FC in a second degree relative is not a risk factor for recurrence of FC and this finding is consistent with Van Esch et.al [19].Family history of epilepsy in this study seen to be a risk factor for recurrence of FC and this finding goes with previous studies [9,12-14,17,18]. Duration of fever before the onset of first FC is not a risk factor for recurrence of FC and this finding is not in agreement with the result of Berg et.al, who founds that short duration of fever before onset of first FC is a risk factor for recurrence FC [12].

Low grade fever (i.e., ≤39°C) at the onset of first FC is a risk factor for recurrence of FC and this result goes with previous reported studies [12,14,22], but this result is not compatible with Al-Eissa and Van Stuijven berg et.al[17,21], also other studies [18,22], found that low temperature at onset of first FC (i.e.,<39°C), is associated with a decreased risk of recurrence, which goes with Offringa et.al study [14].

Complex first FC is not a risk factor for recurrence of FC in this study group this result not compatible to Knudsen, Bessisso et.al and Al Eissa results [9,15,17],but similar to what is found by Berg et.al, who found that complex febrile seizures did not increase the risk of recurrence FC [11].

We have shown that frequent febrile illnesses (more than four illnesses per year), increases the possibility of recurrence of FC and this finding similar to the study conducted by Offringa et.al [14], while Al-Eissa, and Van Stuijven berg et.al found that febrile illnesses is not a risk factor [17, 21].

Conclusions:

The risk factors associated with increase incidence of recurrence FC are: male sex, age less than 12 months at the onset of the first FC, family history of FC in a first degree relative, low temperature(<= 39 cº.) at the onset of the first FC &frequent attack of febrile illnesses (>4per year), family history of epilepsy.

Family history of FC in a second degree relative and duration of fever (neither long nor short) before the onset of the first FC, type of convulsion are not a risk factors for recurrent FC.

Recommendations:

1- Those children with high risk of recurrence should be started on prophylaxis after the first FC or at onset of each febrile illness oral diazepam (0.25 mg/kg every eight hours) is administrated for the duration of illness (usually 2-3 days).
2- Improve educational level of the mothers about the risk of recurrence of FC, avoidance of febrile illness, promote medical seeking and close follow up of their children who are at high risk of recurrence with each febrile illness.
3- Pay more attention to the health educational programs and this can be achieved through TV programs, educational leaflet, lectures.

References:

1. Engel J Jr. A proposed diagnostic scheme for people with epileptic seizures and with epilepsy: report of the ILAE task force on classification and terminology. Epilepsia 2001; 42:796-803.
2. Baumann RJ, Duffner PK. Treatment of children with simple febrile seizures: the AAP practice parameter. American Academy of Pediatrics. Pediatr Neurol 2000; 23(1):11- 17.
3. Offringa M, Moyer VA. Evidence based paediatrics: Evidence based management of seizures associated with fever. BMJ 2001; 323(7321):1111- 14.
4. Eric Marsh and Amy R. Brooks- Kayal. Febrile seizures. In: M. William Schwartz. The 5- minute Pediatrics Consult. 4th ed. Lippincott Williams and Wilkins: 2005; P.771- 72.
5. Mohamad A. Mikati. Febrile Seizures. In: Behrman RE. Kliegman RM, Jenson HB eds. Nelson Textbook of Pediatrics. 19th ed Philadelphia, pa:Nwb Saunders Co: 2012; 586: 2017.
6. Barlow WE, Davis RL, Glasser JW, et al. The risk of seizures after receipt of whole-cell pertussis or measles, mumps, and rubella vaccine. N Engl J Med 2001; 345:656-61.
7. Al-Eissa YA. Febrile seizures: rate and risk factors of recurrence. J Child Neurol 1995; 10:315-19.
8. Berg AT, Shinnar S, Hauser WA, et al. Predictors of recurrent febrile seizures: a metaanalytic review. J Pediatr 1990; 116:329-37.
9. Knudsen FU. Recurrence risk after first febrile seizure and effect of short term diazepam prophylaxis-a prospective randomized study, 1985:60(11):1045- 49.
10. Tarkka R, Rantala H, Uhari M. Risk of recurrence and outcome after the first febrile seizure. Pediatr Neurol 1998; 18:218- 20.
11. Berg AT,Shinnar S, Hauser W et al.Predictors of recurrent febrile seizures a prospective study of circumstances surrounding the initial febrile seizure.New England journal of medicine ,1992,327,1112- 27.
12. Berg AT,Shinnar S, Darefsky AS et al. Complex febrile seizure.Epilepsia,1996;37(2),126- 33.
13. Martin-Fernandez JJ, Molto-Jorda JM et al. Risk factors in recurrent febrile seizure. Rev Neurol.1996; 24(136):1520-24.
14. Offringa M, Derksen-Lubsen G et.al. Risk factors for the occurrence of recurrent convulsions following afebrile convulsion. Ned Tijdschr Geneeskd.1992; 136(11):516- 21.
15. Bessisso MS, Elsaid MF, Almula NA, Kadomi NK et.al. Recurrence risk factor of first febrile convulsion. Saudia Med J 2001;22(3):254- 58.
16. Airede AI. Febrile convulsions: factors and recurrence rate. Trop Geogr Med.1992; 44(3):233- 37.
17. Al-Eissa YA. Febrile seizures: rate and risk factors or recurrence. J child Neurol 1995; 10(4):315- 19.
18. Dura -Trave T, Yolidi-Petri ME. A long term follow up of 234 children with febrile seizure. Rev.Neurol.2004; 39(12):1104-1108.
19. Van Esch A, Steyerberg EW, Berger MY et.al. Family history and recurrence of febrile seizures. Arch .Dis child. 1194; 70(5):395- 99.
20. Laditan AA. Seizure recurrent after a first febrile convulsion. Ann Trop Paediatr.1994;14(4):303-308.
21. Van Stuijven Berg M, Steyerberg EW, Derksen-Lubsent G, Moll HA. Temperature, age and recurrence of febrile seizure. Arch pediatric Adoles Med.1998; 152(12):1170- 75.
22. El Radhi AS, Lower degree of fever at the initial febrile convulsion is associated with increased risk of subsequent convulsion. European journal of pediatric Neurology. 1998; 2(2):91-96.